

Claims

What is claimed is:

- 465 1. A fast image region partition method comprises the steps of:
- a) Input a component labeled image;
 - b) Perform a two pass ZOI creation method using the component labeled image to create a ZOI image.
- 470 2. The fast image region partition method of claim 1 further comprises the steps of:
- a) Input an input image;
 - b) Perform component labeling using the input image to create the component labeled image.
- 475 3. The fast image region partition method of claim 1 wherein the two pass ZOI creation step further comprises the steps of:
- a) Perform a first pass scan using the component labeled image to create a first pass intermediate distance image and a shortest distance component label image;
 - 480 b) Perform a second pass scan using the first pass intermediate distance image and the shortest distance component label image to create a background distance transform image and a updated shortest distance component label image.
- 485 4. The two pass ZOI creation step of claim 3 wherein the first pass scan depends on a selected set of adjacent neighbors and their distance lengths.
5. The two pass ZOI creation step of claim 3 wherein the second pass scan depends on a selected set of adjacent neighbors and their distance lengths.
- 490 6. An adaptive image region partition method comprises the steps of:
- a) Input a component labeled image;

- b) Perform an adaptive two pass ZOI creation method using the component labeled image to create an adaptive ZOI image.

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7. The adaptive image region partition method of claim 6 further comprises the steps of:

- a) Input an input image;
- b) Perform component labeling using the input image to create the component labeled image.

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8. The adaptive image region partition method of claim 6 wherein the adaptive two pass ZOI creation step further comprises the steps of:

- a) Perform a first pass scan using the component labeled image to create a first pass intermediate adaptive distance image and an adaptive shortest distance component label image;
- b) Perform a second pass scan using the first pass intermediate adaptive distance image and the adaptive shortest distance component label image to create an adaptive distance transform image and an updated adaptive shortest distance component label image.

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9. The two pass adaptive ZOI creation step of claim 8 wherein the first pass scan depends on a selected set of adjacent neighbors and their distance lengths wherein the distance lengths depend on their associated component labels.

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10. The two pass ZOI creation step of claim 8 wherein the second pass scan depends on a selected set of adjacent neighbors and their distance lengths wherein the distance lengths depend on their associated component labels.

11. A cell segmentation method comprises the steps of:

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- a) Input a nuclei mask image;
- b) Input a cell mask image;
- c) Perform nuclei region partition using the nuclei mask image to create nuclei mask ZOI;

525 d) Perform cell region separation using the cell masks and the nuclei mask ZOI
to generate cell separated regions.

12. An adaptive cell segmentation method comprises the steps of:

- a) Input a nuclei mask image;
- b) Input a cell mask image;
- 530 c) Perform adaptive nuclei region partition using the nuclei mask image to create
adaptive nuclei mask ZOI;
- d) Perform adaptive cell region separation using the cell masks and the adaptive
nuclei mask ZOI to generate adaptive cell separated regions.

535 13. The adaptive cell segmentation method of claim 12 further excludes the pixels close
to the adaptive nuclei mask ZOI boundaries.

14. The adaptive cell segmentation method of claim 12 wherein the adaptive nuclei
region partition method uses cell size estimate as the weighting factor for the length
540 function.

15. An adaptive dilation method comprises the steps of:

- a) Input an image;
- b) Perform an adaptive background distance transform using the input image to
545 create an adaptive background distance transform image;
- c) Perform a threshold on the adaptive background distance transform image to
generate adaptive dilation image output.

16. The adaptive dilation method of claim 15 wherein the adaptive background distance
550 transform uses a two pass method.

17. An adaptive erosion method comprises the steps of:

- a) Input an image;

- 555 b) Perform an adaptive foreground distance transform using the input image to
create an adaptive foreground distance transform image;
- c) Perform a threshold on the adaptive foreground distance transform image to
generate adaptive erosion image output.

560 18. The adaptive erosion method of claim 17 wherein the adaptive foreground distance
transform uses a two pass method.